

**Acoustical Analysis Report**

**Paseo De La Playa  
Santa Barbara, California**

**Prepared for  
Wright & Company**

**By  
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**January 29, 2007**

**Veneklasen Associates, Inc.  
1711 Sixteenth Street  
Santa Monica, California 90404**

## EXECUTIVE SUMMARY

An acoustical analysis report has been completed for three housing projects on three parcels of land in the City of Santa Barbara. The purpose of this study is to document the noise environment at these sites and determine the necessary construction procedures for compliance with the relevant codes and standards. The structures must comply with the California Noise Insulation Standard (Title 24) as well as the City of Santa Barbara General Plan Requirements. The interior noise levels, due to external sources, must not exceed a level of 45. The metric for this requirement is  $L_{dn}$  (Day-Night Level). The noise at exterior accessible and usable areas of the buildings must be below  $L_{dn}$  60. The interior party walls and floor ceiling structures must be built to yield a minimum STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings of 50. Typical details for these constructions are provided in the Appendix.

Long and short-term noise measurements were performed at the sites to determine the existing environmental noise condition. These measurements were used in estimating the noise levels at accessible and usable exterior and also interior locations of the proposed development.

It is shown that with the implementation of the proposed construction details the interior noise levels as well as the noise levels at exterior accessible and usable locations will comply with all State and local requirements.

## **1. Introduction**

An acoustical analysis has been performed for the Wright Co. projects in the City of Santa Barbara. The projects must comply with the California Noise Insulation Standard (Title 24) as well as the City of Santa Barbara General Plan Requirements. The results of the noise survey analysis, conclusions and recommendations are included in the following sections.

## **2.0 The Sites of the Project**

The three parcels of land for this project are shown in Figures 1-3. Site 1 is located at the southwest corner of Yanonali and Garden Streets. Site 2 is located at 222 Santa Barbara Street and Site 3 is located at 301 East Yanonali Street.

### **The Noise Measurements**

The noise sources affecting these properties are the traffic on U.S. Highway 101, the on and off ramps of the freeway, local traffic on Garden, Yanonali and Santa Barbara Streets. The property lines facing the freeway are the most severely impacted areas of the sites. Other sources in the descending order of impact are Garden Street traffic, Yanonali Street traffic and Santa Barbara Street traffic respectively.

The acoustical requirements of the City of Santa Barbara General Plan are based on  $L_{dn}$  (day-night noise levels) values. To determine these values, noise levels need to be measured for a minimum of 24 hours. Long-term measurements (e.g. monitoring noise continuously) for a minimum duration of 24 hours are therefore necessary to document the acoustical environment for compliance with this criteria.

Long-term (24 hours) noise surveys were conducted at all sites. Larson-Davis Model 820 sound monitors were used for data acquisition. Noise levels were measured and recorded continuously for a 24-hour period. Average hourly levels (hourly  $L_{eq}$ 's); maximum and minimum levels regardless of duration of event and statistical levels were measured during the survey. Short-term noise measurements were also conducted at all locations. These measurements were performed using a B&K Model 2260 hand-held sound level meter. The locations of noise measurements are shown in the Figures as M. The values of  $L_{dn}$  at facades of the three projects have been estimated based on long term and short term measurements and are included in Table 1.

Southern Pacific Railroad lines are located to the south of the project sites. Sites 2 and 3 are located about 880 feet and 775 feet away from the rails respectively. Site 1 is located closer to the rails. The nearest structure at this site is about 150 feet away from the tracks.

Train horns typically generate sound levels of about 100 to 104 dBA at 50 feet distances for short durations. The sound levels will be reduced to 75-80 dBA at sites 2 and 3 however the levels at the most southerly parts of site 1 will experience higher sound levels (approximately 90-95 dBA). The sound of horns will be audible at all locations, however due to the short durations of the produced sounds the impact on  $L_{dn}$  is insignificant (less than 1 dBA).

## **4. The Noise Criteria**

The proposed development must comply with the noise requirements as stated in the Noise Element which is part of the City of Santa Barbara General Plan. The requirements state that the interior noise levels must not exceed a  $L_{dn}$  value of 45 and exterior locations designated as accessible and usable must not exceed a  $L_{dn}$  value of 60. These levels will be used as the basic acoustic design criteria for the project.

## **5. Noise Level Calculations**

### **5.1 Interior Noise Levels**

The noise levels reported in Table 1 were used for calculating interior noise levels in typical rooms on the sides of the two structures. The interior noise levels depend on the sound transmission characteristics of doors, windows, walls and roof as well as the interior furnishings of the rooms. The calculations were performed for typical bedrooms and typical living rooms. The results of these calculations are included in Table 2. Typical computer calculation sheets are also enclosed in the Appendix.

As it may be observed the noise criteria ( $L_{dn} 45$ ) is satisfied for all interior spaces. These noise levels are based on the STC rating of doors and windows as shown in Table 3.

## **5.2 Exterior Noise Levels at Accessible and Usable Areas**

Preliminary and schematic drawings have been prepared for all three proposed projects. Exterior areas of the project which may be considered as accessible and usable have been reviewed and the noise levels have been estimated. The exterior spaces for both sites 1 and 2 are shielded effectively by intervening structures and the estimated noise levels will be below  $L_{dn} 60$ . The only exterior usable area for site 3 is an outdoor deck behind the bedroom and living room of the residential unit which is designated as living quarters for the building manager. This area is also shielded effectively for both freeway and Garden Street traffic. The estimated noise levels at all accessible and usable areas are included in Table 4.

## **6.0 Interior, Exterior, Partition Walls and Floor-Ceiling Assemblies**

The interior party walls of the project must be constructed (Title 24 and UBC Standard) to yield a STC rating of 50. STC (Sound Transmission Class) is a single number rating used for assessing the noise reduction effectiveness of walls or partitions. The minimum specified STC is 50. A typical party wall yielding STC-50 is included in the Appendix (detail P-5L).

Although there are no specific STC requirements for exterior walls, the noise reduction for these structures must be rated such that the resulting interior noise levels comply with the interior CNEL or  $L_{dn}$  requirements (rating of 45). A typical exterior wall is included in the Appendix (detail P-3D). This wall will yield an STC-50 rating and will result in interior noise levels of 45 or less throughout the project.

The floor-ceiling assemblies must also comply with the minimum STC 50 requirements in addition to IIC (Impact Insulation Class) requirement. IIC is also a single number rating which is used to assess the effectiveness of the floor-ceiling assembling for footfall and drop impact induced noise. The minimum required IIC level is 50. A typical floor-ceiling assembly which yields this rating is also included in the Appendix (detail F-7L).

## **7.0 Ventilation Requirement**

The interior noise levels throughout the project will exceed  $L_{dn} 45$  criteria limit if the windows are left open. Therefore it is necessary to provide mechanical air circulation and ventilation for all units.

## **8.0 Future Noise Levels**

The future noise levels are expected to increase by 1 decibel within the next 20 years. This estimate is based on the expected increase in traffic flow volume. Both interior and exterior noise levels will still be in compliance with all requirements.

**Table 1**

**Exterior Noise Levels at Different Facades of the Buildings**

<b>Building Location</b>	<b>Façade</b>	<b>L<sub>dn</sub></b>
101 Garden Street Site 1	North	66
	East & South	66
	West	60
222 Santa Barbara Street Site 2	North (facing Freeway)	71
	West	67
	South	57
	East	57
301 E. Yanonali Street Site 3	North (facing Freeway)	74
	West	71
	South	66
	East	71

**Notes:**

1. These L<sub>dn</sub> values are estimated based on long-term measured values at locations shown as M in Figures 1-3 and also using short-term measurements.

**Table 2**  
**Estimated Interior Noise Levels**

<b>Building Location</b>	<b>Facade</b>	<b>L<sub>dn</sub></b>
101 Garden Street Site 1	North	40
	East & Southeast	40
	West	< 40
222 Santa Barbara Street Site 2	North	42
	West	40
	South	< 40
	East	< 40
301 E. Yanonali Street Site 3	North	42
	West	42
	South	40
	East	43

**Table 3**  
**Required STC Rating of Windows (for bedroom) and**  
**Sliding Glass Doors (for living room)**

<b>Building Location</b>	<b>Facade</b>	<b>STC</b>
101 Garden Street Site 1	North	30
	East & Southeast	30
	West	(Note 1)
	North	34
222 Santa Barbara Street Site 2	West	30
	South	(Note 1)
	East	(Note 1)
301 E. Yanonali Street Site 3	North	36
	West	34
	South	30
	East	34

**Note:**

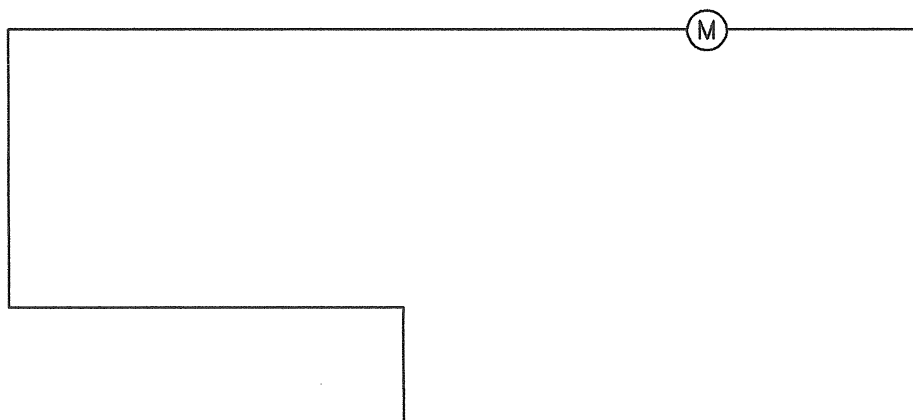
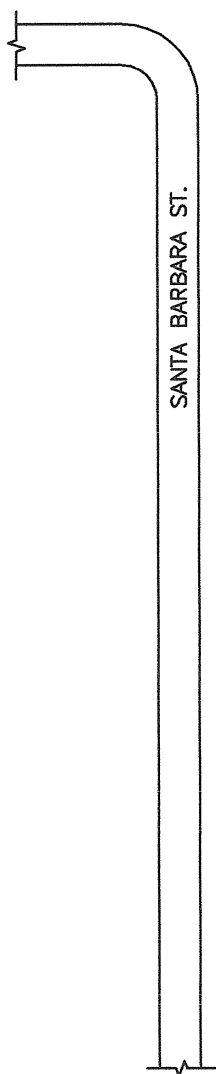
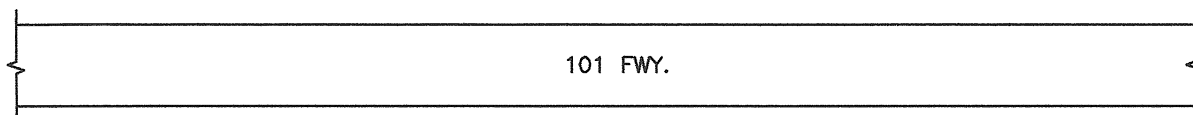
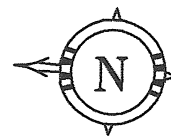
1. For these locations it is not necessary to install sound rated products. Good quality fenestration products provide adequate levels of sound transmission values.

**Table 4**

**Estimated Exterior Noise Levels  
At Accessible and Usable Areas**

<b>Building Location</b>	<b>L<sub>dn</sub></b>
101 Garden Street Site 1	< 60
222 Santa Barbara Street Site 2	< 57
301 E. Yanonali Street Site 3	< 55





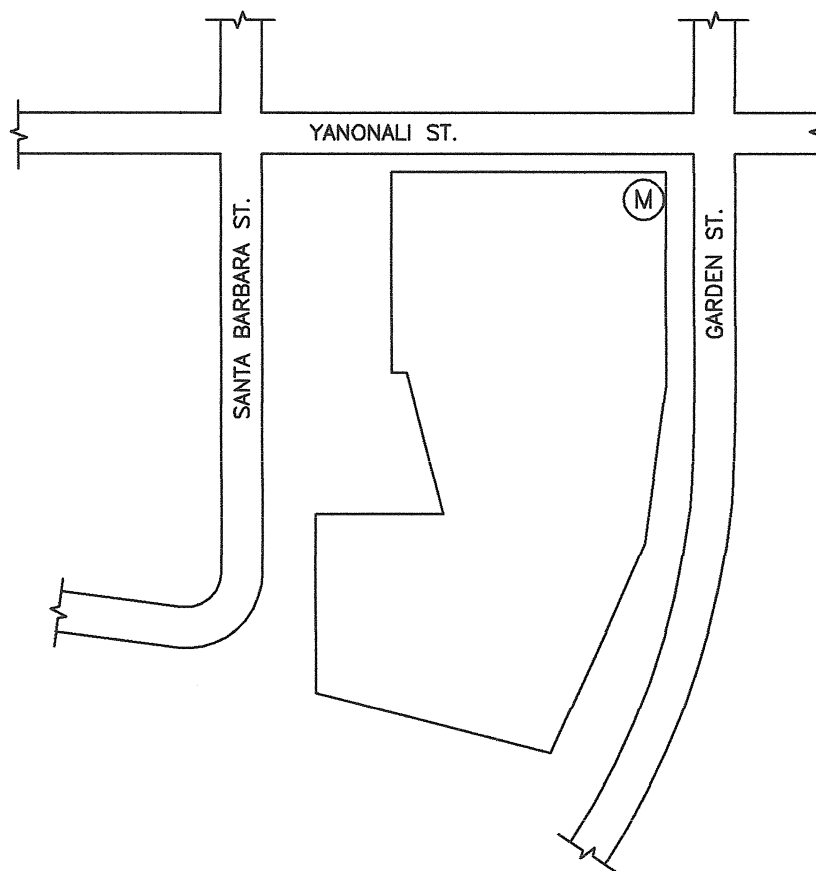
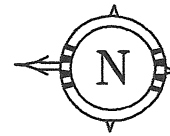
Paseo De La Playa - Site 2  
222 Santa Barbara St.



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FIGURE 1



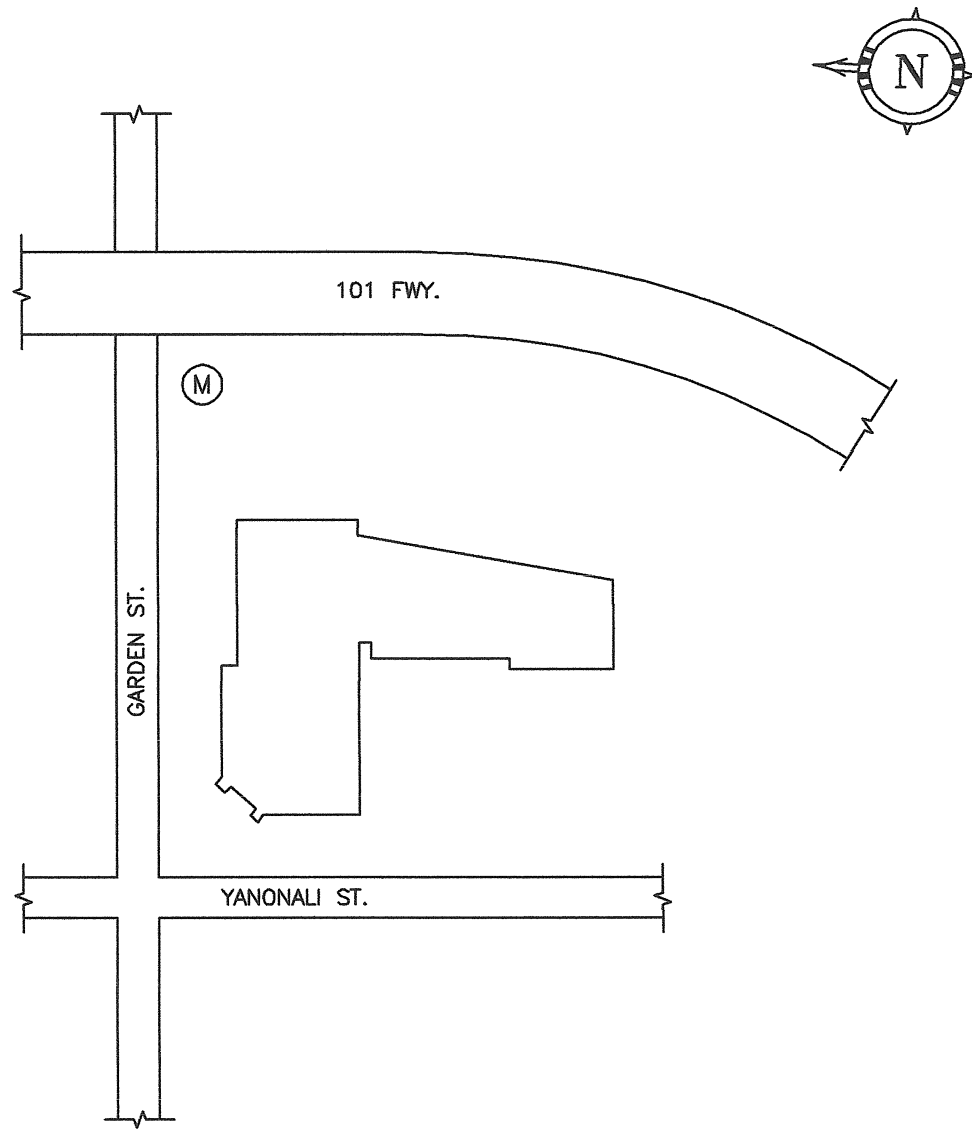
## Paseo De La Playa - Site 1 101 Garden St.



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FIGURE 2



Paseo De La Playa - Site 3  
301 E. Yanonali St.



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FIGURE 3

## Appendix

## **Interior Noise Level Evaluation Sheet**

# COMPUTER NOISE REDUCTION CALCULATION - Paseo de la Playa

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## ABSORPTION COEFFICIENTS

#	CODE	DESCRIPTION	AREA	63	125	250	500	1K	2K	4K	8K
1	17	CARPET WITH PAD	144.	.05	.10	.20	.55	.75	.80	.80	.80
2	21	1/2" OR 5/8" GYPBO	144.	.35	.25	.15	.08	.04	.04	.04	.04
3	48	1/4" GLASS	48.	.30	.20	.15	.10	.05	.04	.04	.04
4	21	1/2" OR 5/8" GYPBO	336.	.35	.25	.15	.08	.04	.04	.04	.04

## PATH SOUND TRANSMISSION LOSS (DB)

PATH	CODE	DESCRIPTION	AREA	63	125	250	500	1K	2K	4K	8K
1	114	SGD:DS-DS AC: STC-34	48.	19	26	31	33	32	33	39	44

## EXTERIOR SOUND PRESSURE LEVELS (DB RE 20 UPA)

63	125	250	500	1K	2K	4K	8K	
72.	72.	72.	71.	70.	67.	62.	56.	DBA= 74.4

## ROOM CONSTANTS (SQ.FT) (VOLUME = 1700.)

63	125	250	500	1K	2K	4K	8K
264.	184.	129.	151.	164.	179.	191.	233.

## THIS IS THE S.P.L. FOR EACH PATH

PATH	LOCATION	63	125	250	500	1K	2K	4K	8K	DBA
1		52.	46.	43.	39.	39.	34.	23.	11.	43.

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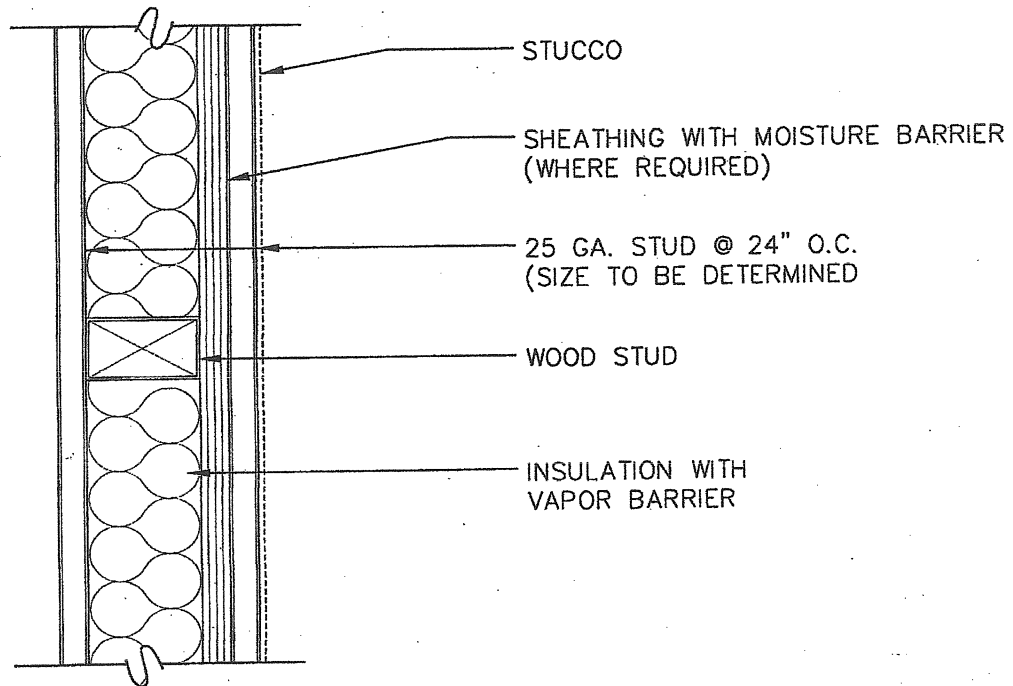
*****
*
*           THIS IS THE TOTAL INTERIOR S.P.L.
*
*           63    125    250    500    1K    2K    4K    8K
*
*           51.6  46.2  42.7  39.0  38.7  34.3  23.0  11.1  DBA = 42.8
*
*           NC-38          LOUDNESS LEVEL = 2.9910 SONES
*
*****

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PAUL S. VENEKLASEN & ASSOCIATES

**Exterior Wall Detail P-3D and Interior Party Walls**

PLAN



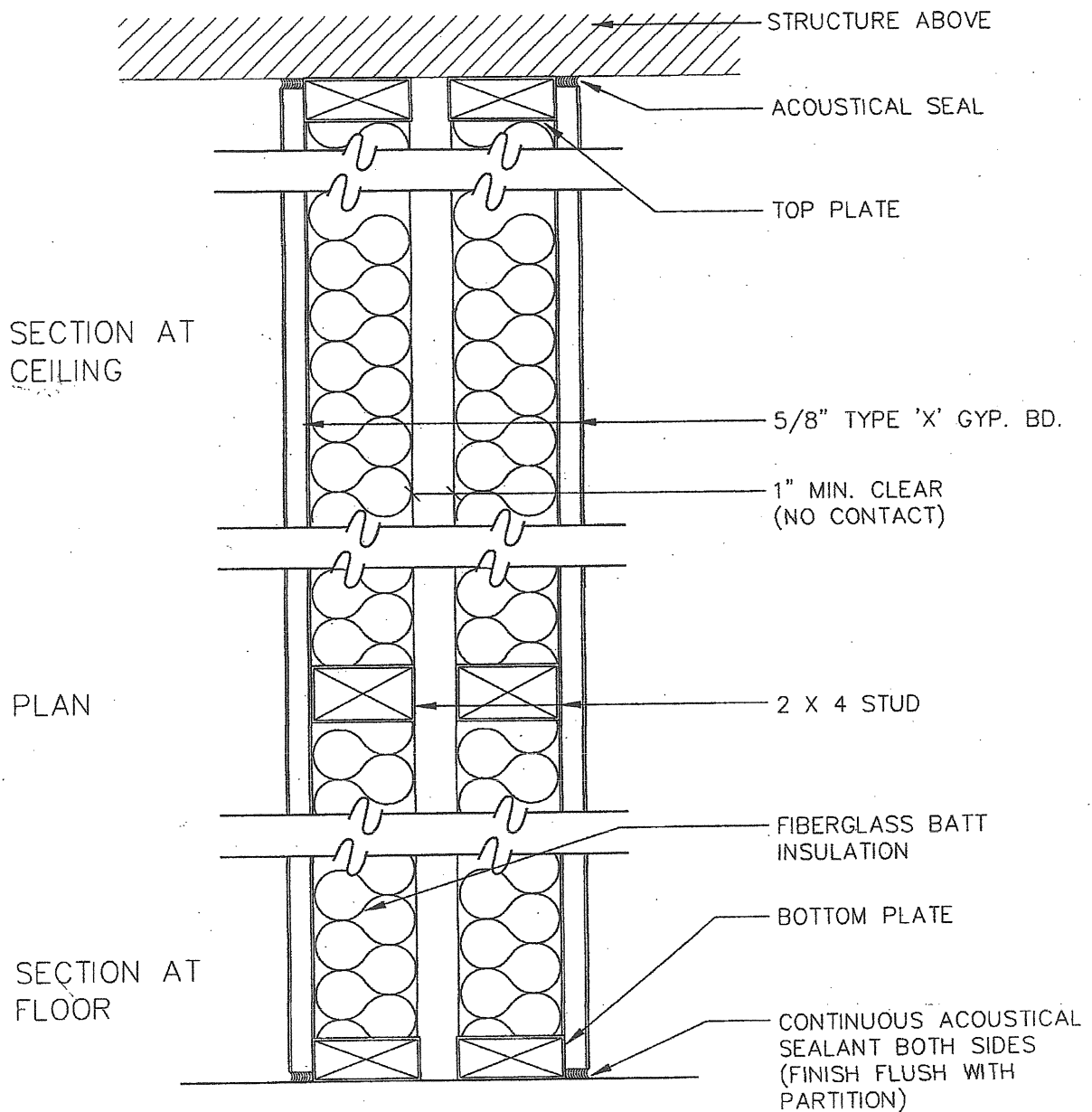
P  
3D

ACOUSTICAL DESIGN INFORMATION ONLY



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### NOTES

1. NO MECHANICAL TIES BETWEEN OPPOSITE SIDE OF PARTITION.
2. KEYHOLES FOR CONDUIT SHALL BE CUT IN WOOD STUDS IN SIDE SERVED.
3. ATTACH PLYWOOD TO STUDS UNDER GYP. BOARD AS REQUIRED BY STRUCTURAL.

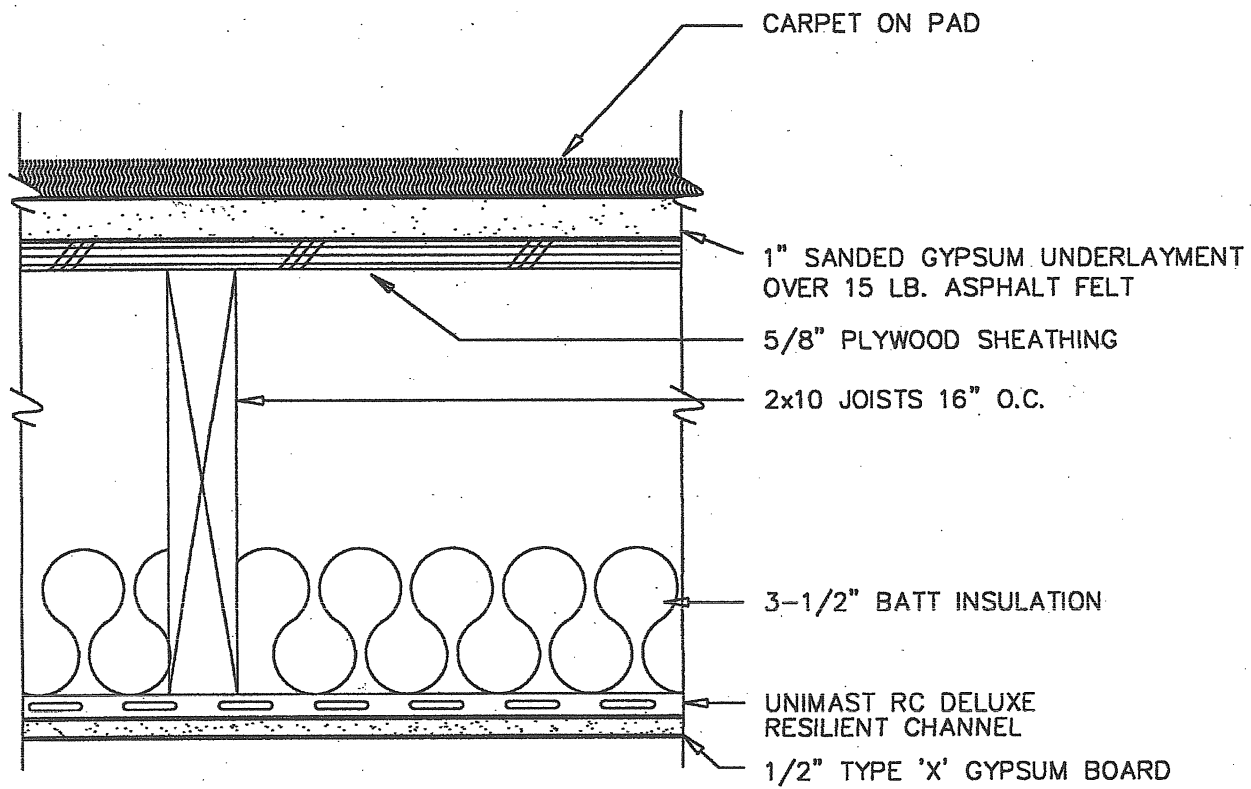


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### **Typical Floor-Ceiling Structure**



SECTION



## TYPICAL FLOOR CEILING ASSEMBLY

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## **Acoustical Specification for Sliding Glass Doors and Windows**

## ACOUSTICAL SPECIFICATION

### SLIDING GLASS DOORS & OPERABLE WINDOWS

#### 1.0 GENERAL

##### 1.01 Work Included

- A. This section includes the furnishing and installation of all sliding glass door and operable window assemblies and frames as scheduled on the drawings and specified herein.
  - 1. Provide complete assemblies, including glass, frame hardware and seals.

##### 1.02 Related Work Specified Elsewhere

- A. Installation of Frames
- B. Other Hollow Metal Work
- C. Finish Hardware
- D. Finish

##### 1.03 Manufacturer

- A. The sliding glass door and operable windows shall be manufactured by a company that has regularly specialized in the manufacture of these assemblies for a period of at least ten (10) years.

##### 1.04 Acoustical Performance

- A. The sound transmission loss of the sliding glass door and operable window assembly shall be certified by a test report from an independent acoustical testing laboratory. The test method shall meet ASTM E90-87 for the laboratory measurements of airborne sound transmission loss of building partitions. The test date shall not be older than ten (10) years from the project bid date.
- B. The assemblies shall be fully operable at the time of test and shall be opened and closed several times prior to measurement. The test shall be on the exact door and window/frame/seal assemblies that are to be supplied for the project.
- C. The sliding glass door or window and frame assemblies shall meet or exceed the following laboratory sound transmission loss values:

##### 1.05 Submittals

- A. At least ten (10) days prior to bid submittal test reports from an independent acoustical laboratory and complete shop drawings of the seals and frames shall be available for review by the Architect. Provide a complete description of the complete assemblies including glazing, seals and hardware and a certified statement that the assembly tested is equal to the assembly to be provided.
- B. Prior to start of fabrication provide the following for approval by the Architect:
  - 1. Acoustical test reports from an independent acoustical testing laboratory. The acoustical testing laboratory shall have been accredited by the U.S. Department of Commerce, National Bureau of Standards under the National Voluntary Accreditation Program (NVLAP) for this test procedure.

2. Manufacturer's detailed specifications including installation instructions.
3. Shop drawings showing doors and windows, frames and seals. Also show frame and door sizes and types as scheduled and detailed.

1.06 Guarantee

- A. All material furnished under this section shall be guaranteed free from defects in workmanship and material for a period of one year after installation.

**2.0 Products**

2.01 Manufacturer

- A. The products shall be manufactured by a company that has regularly specialized in this equipment for a period of at least ten (10) years.

**3.0 Execution**

3.01 General

- A. Coordinate installation with work of other trades.
- B. Level sub-floor so that they contact a straightedge for the width of the opening.
- C. Doors, Windows and Frames shall be installed in accordance with the manufacturers written instructions. Frames shall be securely anchored to the floor and held plumb and square by the wall construction.
- D. After the assembly has been built into the walls and all finish hardware installed, all operating parts shall be adjusted for smooth operation and continuous contact between perimeter seals and adjoining surfaces.

-END OF SECTION-